

SURVEY OF MEDICAL EDUCATION IN SWEDEN

In presenting a survey of medical education in Sweden I have been inclined to dispense with the presentation of a number of preliminary and, in a sense, secondary information, since this is already available in the Preliminary Report of Sweden prepared by the Information Service, and in the report of Mr. Gunn for the International Health Division upon Public Health in Sweden. I have also kept in mind the fact that through travelling fellows already accepted from that country, we have obtained certain types of information and are in a position to obtain more details very readily if need be.

It would seem desirable, however, to review certain distinguishing characteristics of the country, and the Swedish as a people, and to point out distinctive characteristics of the field of medical education in Sweden. Rather than resorting for the moment to statistical statements and figures, etc., I should like to present some comparisons and remarks of a rather more general nature which are, however, in the last analysis, more easily kept in mind.

Sweden is a small country in point of population (6,000,000) but extensive and scantily settled and therefore presenting problems in transportation, communication and conditions of human life that are markedly different from the other small countries of Europe, such as Denmark, Switzerland or Belgium. It is a country, furthermore, on the

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periphery of Europe, and, being separated by the sea from all but one neighbour, enjoys, and has long enjoyed, a degree of independence and protection against invasion that can be compared only with the British Isles. In addition to this geographical independence which has its political implications, Sweden has occupied in the economic development of Europe a position which has for many years been secure, even if modest. The agricultural organization in Sweden was never threatened by the cheap food of the New World, as has been the case during the last 100 years in France, nor has industrial development taken place in Sweden with the almost dangerous rapidity that has characterized England or Germany. Timber has become valuable slowly. Hydro-electric power has been developed relatively recently; the mineral wealth of Sweden has undergone a slower exploitation than that of other countries with metallurgical resources. At any rate, the social picture in Sweden is one of stability. In its slower growth has come a more generalized prosperity, with less extremes of poverty or opulence than is the case of other countries with more rapid development.

Sweden is a country racially more homogenous than are the larger countries, and indeed more homogenous socially than such smaller countries as Belgium, Ireland or the Baltic Provinces. Religion does not divide the country against itself nor are there questions of language or actual racial stock that preoccupy men's minds and result in sectional prejudices.

In point of colonies and the rôle played by colonies, Sweden

differs from Ireland, England or Holland and is more comparable to Switzerland or Denmark. It is true that a large emigration to America has taken place. But Sweden possesses no outlet for its administrative genius and no source of handsome revenue from colonial possessions analogous to those of Holland. The country is one where tradition and conservatism are still powerful, and is not faced, as are Poland, Czechoslovakia or the Baltic countries, with the difficulties of establishing self-government among people long accustomed to domination from a distant capital. Unlike England where one has the impression that perfect familiarity with a foreign tongue is regarded with respectful suspicion, Sweden, in its contact with the rest of Europe, resembles Switzerland in that the educated people are at home in at least one foreign language, if indeed not two or three.

One has the impression that the Swedish people are level-headed, practical, moderate and rather slow in their mental operations, which are none the less sound and comprehensive. Swedes do not seem to be bowled over by brilliance; nor do they like to dominate. I would suspect that they would question the poetic enthusiasm of Kipling's references to the white man's burden. Without being cynical, hypocritical or bitter, they simply are not capable of those great waves of self-depreciation or self-distrust which are the irresistible invitation to dominance from abroad. I do not refer merely to political dominance, which, as far as I am aware, has rarely, if ever, taken place in Sweden, but also to the sort of enthusiasm for the culture of, say, France, which

one finds in Roumania or South-America. The race has never been spoilt by too easy a living accorded it by nature. Distances are great and the fields are stony, and one takes a very sober view of life on the Swedish country-side, - patience and enduring will-power are called out. The Swedes are solid, practical, kindly and patient. They seem to adjust themselves to new conditions slowly but surely, whether it be as chauffeurs of automobiles or as administrators of city hospitals. Their slowness is not from prejudice nor from fear, nor from conscious glory in maintaining a tradition, but rather perhaps that they think slowly and act slowly by nature.

Swedish medical education is distinguished by the length of the studies necessary to secure the right to practice, the practical and thorough nature of the instruction given, the distinctively university flavour of this education, the cosmopolitan and well informed point of view of the teachers and the strong emphasis laid upon distinction as a student or scholar rather than brilliance as a lecturer or performer.

Ten years to become a practitioner is not intolerable to a slow and solid nature; practical and thorough training seems indispensable if one must take the position of a district doctor with no professional colleagues within miles.

A visit to Sweden gives the impression that its universities of Upsala, first, and Lund, later, were places to which every region in the country has contributed, little by little, money and men. Upsala seems a place to which intellects have come, not as in the case of

Florence, for example, a place in which the intellects have developed, nor again a place which has sought to dominate intellectually, as is the case now with Paris. One sees tangible evidence of such a condition in the survival at Lund and Upsala of the mediæval custom of student life divided by nations. In the Swedish universities these nations represent what are now the provinces of Sweden, and the 450 stipends (scholarships and prizes) at Upsala are largely provided through funds left to the nations to be distributed for these ends. Upsala and Lund are natural crystals in a homogeneous solution. Their relation to the rest of Sweden has been intimate, unforced and natural. Neither of these towns have ever been important politically and commercially. There is no jealousy, no separatism, no regional quarelling.

Sweden does not suffer, as does Denmark, from having only one university, nor does it suffer in another way, as does Holland or Ireland, from having too many for its size. There is some interchange of personnel, but without bitter rivalry or parochial jealousy. It has not been an earthly paradise, however, for, without question, the development of the Karolinska Institutet in Stockholm was inhibited to the best ability of the two universities. In most other ways, however, the universities have shown an admirable power to cooperate with other undertakings of social import, without trying, under the guise of cooperation, to swallow them alive. Thus the relation between all of the medical schools of Sweden and their hospitals has arrived at being one of mutual trust and co-operation rather than a bitter struggle for domination, or an over-emphasis upon the value of competitive effort.

There are, however, some characteristics of medical education in Sweden which are concrete and distinctive although not individually peculiar to Sweden alone. The pre-clinical studies are sharply set apart from the years devoted to clinical work. A student having finished these pre-clinical studies obtains the title of Kandidat and is sharply set apart from the group to which he has recently belonged. Another characteristic of Swedish medical education, which it shares with the other Scandinavian countries, is the nomination upon the committee to choose a professor, of at least one representative from another of the Scandinavian countries, whose serious and time-consuming responsibility it is to aid in the selection of the new professor.

In Sweden, the rules and regulations regarding the practice of medicine in some ways interfere more sharply with what is known as individual freedom than in most countries. Professors are allowed to take private cases in the university hospitals, but there is a definite and indeed rigorous restriction of the fees they may charge. This, together with careful hospital administration, results in a remarkably low cost of medical care. There are a large number of doctors in the employ of the State, and yet with all this preoccupation to make the services of doctors meet the needs of the people, the social and financial status of the physician in Sweden is excellent, and the profession is not seriously overcrowded.

Training in medicine is too long and costly to be an easily opened door to a career. The sparse settlement of the country would

make haphazard or careless medical education almost immoral. Relatively few young doctors in Sweden occupy the position of assistant to an older man. Far from their nearest colleague, each physician must be self-reliant--well trained. It is the university which is responsible for the thoroughness of the doctor's training in Sweden. The State accepts, to all intents and purposes, the guarantee of the University.

It is not distinctive of Sweden that its teaching force, as a result of failure to adjust to post-war prices, is inadequately paid, and that the State budgets available to pay expenses of research are entirely inadequate. These financial troubles, however, appear to have less effect upon productivity and recruitment than is the case in other countries. Sweden did not lose large numbers of young men in the war, nor has its commercial and industrial life undergone as many changes as have those of Germany and France. Consequently, there are not so many parallel attractions to young men in Sweden which serve to draw them away from academic careers.

We see then a stable effective form of medical education in Sweden, meeting social responsibilities effectively, satisfying the high standards of a flourishing profession, and contributing to medical progress in a degree indeniably creditable for a nation of only six million people.

GEOGRAPHICAL AND SOCIOLOGICAL BACKGROUND

No description of the methods and technique of medical education in any country can be effective unless reference is made to the conditions which these methods have been devised to meet. The dominant fact about the Swedish doctor's training is that in most cases he must be prepared to be part of a scant population over a large territory. More than one third of Sweden has a population of less than 10 per square mile; another third has a population of between 20 and 50; there are only three areas where the population is really dense, i.e. over 200 per square mile. These are around Lund, between Stockholm and Upsala, and around Göteborg.

This type of population means that the doctor in practice in Sweden has for the most part few professional competitors or helpers, and it is of great importance consequently that he have a thorough and generalized training and that his university degree signify an already appreciable familiarity with his professional duties.

The telephone, automobile and the railway have done much to diminish the difficulties of reaching patients scattered over a wide area. But still it remains true that even when supported by the facilities of the cottage hospital and improved methods of communication and transport, the physician in Sweden has both the advantage and disadvantage of having relatively little professional competition. The advantages express themselves in a security of position both financial and social,

and the disadvantage, in one sense, lies in isolation and in the fact that, as a young man, the Swedish doctor does not pass through a long period of apprenticeship unless indeed in the largest cities. It therefore becomes necessary for him to spend a longer period of time in training before he takes up his practice.

There are few great fortunes in Sweden, and the economic picture is one of a rather equal distribution of wealth among an industrious and a careful population, with neither conspicuous poverty nor very exceptional wealth. The government is conservative and more highly centralized than that of Norway, and the power of the Crown considerably greater. The economic position of the country is, in general, very sound, since in addition to forest products and a well-developed agriculture in the South, Sweden possesses large quantities of hydro-electric power and deposits of mineral ores, particularly iron, of very great value. The country has possessed an excellent educational system for so long a time that in technical education it is well able to compete with any of its neighbours. One feature of the life in Sweden made a particular impression upon me, namely that being to a certain extent politically neutral in the problems of Europe, and at the same time able to take advantage of the cultures of England, France and Germany, the Swedes were critical yet unbiassed by political sympathies, well informed without being confused, and secure economically without any danger of extremes of luxury.

ORGANIZATION OF SCHOOLS

The status of the three medical schools in Sweden is relatively simple in spite of the fact that there are some differences between Stockholm and the two universities of Lund and Upsala.

The University of Upsala dates from 1477, and the first professor of medicine there occupied the eighth chair of the University in 1595. Upsala is definitely the senior university of Sweden, and has a great prestige, both in the past and at present. Lund is in a part of Sweden that geographically and culturally is more nearly Danish than Swedish; indeed for a long time Lund was in one of the provinces of Denmark. Its position may be more readily understood when it is known that it takes two hours to go from Lund to Copenhagen, but twelve hours to go from Lund to Stockholm. There is, however, no trace of separatist feeling or political ferment in Southern Sweden, and in the last analysis Upsala and Lund as universities may be grouped together in contrast to the Karolinska Institutet of Stockholm. About 110 years ago, in order to produce military surgeons and ~~lecturers~~ teachers, the Karolinska Institutet was formed in Stockholm, in an atmosphere that was severely practical. At that time Upsala was the seat of Hippocratic medicine, where academic theories were learned and the weight of tradition was against experiment and the production of mere practitioners. It was hardly to the interest of Upsala to relinquish its right to licence practitioners, and only in 1890 was the Karolinska Institutet qualified to give the rank of Licenciator, and not until about 1908 - the doctorate. But obviously during the past 50 years,

with the growth of the city of Stockholm and the concomitant increase in clinical facilities, the Karolinska Institutet has come into a better and better position from the standpoint of clinical instruction. Old prejudices have died out, and the development of medicine has kept the medical faculty of Upsala preoccupied with own development and with less time to hold back the growth of another teaching center. Traces of uncontrolled growth remain, however, in Stockholm, and one has the impression there far more sharply than in either Lund or Upsala that on the clinical side teachers in Stockholm are first hospital chiefs, and teachers afterwards. This is less the case at the Serafimerlazarett than elsewhere. But, in any event one can say that the wide dispersion of hospital facilities prevents the unity that is so characteristic of Lund and Upsala. Again in Stockholm, theoretical branches are inadequately housed and struggling under conditions that it would be unfair to call hostile and yet inaccurate to consider as a true university atmosphere.

There is nothing remarkable or exceptional in the organization of these medical schools that distinguishes them sharply from similar institutes in Denmark, Norway or some other countries that are already familiar to us. An exception might be made, however, of the role played by the University Chancellor. His is an office politically independent and one of great honour and influence. It is a life appointment and he is chosen by the universities with, I believe, the concurrence of the Karolinska Institutet. He has his own staff, and his work is to keep up the universities - and keep them even. It so happens that the present incumbent, Trygger, is Minister of Foreign Affairs in Sweden, and

consequently the real work falls upon the Pro-Chancellors, who are the Bishops of Skåne and Upsala. In spite of his other preoccupations, the Chancellor has the last word on building questions in the universities and upon professorial appointments. He is expected to defend the interests of the universities in the Rigstag, and has been found to be a most valuable protagonist. He does not encroach upon the duties of the Minister of Public Instruction, but rather supplements this official in caring especially for the interests of higher education.

Dean. The office of the Dean is held for one year only and is rotated among all the members of the faculty. All questions of great importance are discussed first by the faculty, second by the University Council, or Konsistorium, and then are passed to the Bureau of the Chancellor of the Universities. The judges appointed to choose professors for vacant chairs are nominated by the faculty, the University Konsistorium and the Chancellor. It is rare that the choice of a professor is made in less than a year.

Chancellor. The Chancellor of the Universities is elected by all full professors at the two State universities. The candidate receiving the majority of the votes must be appointed by the Government, or a new election must be called for. Experience has shown that the principle of self-government in the universities is thus preserved very satisfactorily since the Chancellor protects the universities against detailed bureaucratic influences on the part of the government.

Karolinska Institutet. The organization of the Karolinska Institutet

is somewhat different from that of a faculty. The governing body consists of a Collegium of all professors. It regulates matters of internal government, and takes the ordinary administrative decisions. The chairman of the Collegium is elected for three years rather than being as, in the universities, the Dean, under a term of one year only. The Collegium appoints from its own members various committees for specific purposes, such as management of library, etc. The Karolinska Institutet is under the Chancellor of the Universities. There are no trustees at the Karolinska Institutet and in this part it resembles the universities.

COST OF THE SCHOOL AND BUDGET CONTROL

The cost of medical education in Sweden is difficult to estimate, since the school budgets are not published. The budgets for institutes or departments are very much too low, varying between 1,000 and 3,000 Kronen annually per institute. The budget is made up by the medical faculty and submitted to the University, which, in turn, submits its total budget to an officer not existing in other European countries, but known in Sweden as the Chancellor of the Universities. The Chancellor is a person of considerable political prestige, and it is his responsibility to fight the financial battle for the universities in the Rigstag.

The status of medical research in Sweden would be extremely unfavourable if it were not for the assistance given from the Johann Andersons Fond, a foundation with a capital of about 5,000,000 Kronen, the income from which is distributed for the support of scientific research among the two universities and the Karolinska Institutet, by a special committee chosen from the members of the Karolinska Institutet. The services of this fund in supporting scientific research in Sweden are unanimously recognized as being of the very greatest value and importance. But it is specifically designed only to take care of material expenses and salaries or scholarships for scientific workers and cannot be employed for buildings. In several cases, the budgets for the clinical specialties are almost negligible.

For reasons of economy the Swedish State Statistical Bureau has published no accounts since 1922 which would furnish material or tables indicating school cost, budget control, number of students, etc.

It is, of course, possible for the universities to own real estate, bonds, etc., and to receive legacies. The income at Lund for the last year was about 100,000 Kronen from property of this kind, much of it being ear-marked for use as stipends for the students.

PHYSICAL EQUIPMENT, BUILDINGS, ETC.

The buildings and physical equipment of the three medical schools in Sweden deserve a brief description. In Lund, the laboratories are a mixture of old and new. Anatomy, Physiology and Pathological Anatomy are all from 30 to 40 years old. Pharmacology, Bio-Chemistry and Hygiene are all housed together in a splendid new building. The hospital, which is that of the province, contains buildings of various ages - Medicine, Pediatrics and Orthopedics all being recent and well-appointed structures. Gynecology and Obstetrics is also modern and in excellent condition. On the whole, Lund has an adequate physical equipment in view of the number of students (400) and the relatively small classes which the long curriculum requires. One interesting feature of the laboratory of Physiology is that the top floor of this building is given to bedrooms not only for the present staff of assistants but for a few of the former assistants who are now in the more advanced stage of their medical training. In this way, Professor Thunberg secures the interest and co-operation of his former assistants in the training and guidance of his present helpers, and is thus enabled to continue an excellent tradition among the younger men who frequently continue special work in Physiology.

On the whole, the buildings at Uppsala give an impression less favourable than that of Lund. The clinical branches are housed in buildings much more modern than those of the medical sciences. The Surgical Clinic dates from 1923 and the rest of the clinics have been

remodelled and are in excellent condition, except for that of Gynecology and that of Otology. The hospital buildings belong to the government of Sweden and are not provincial as at Lund or municipal as for the most part in Stockholm. Anatomy, Histology and Embryology are housed in a building erected in 1886, and that of Pathological Anatomy is of about the same age. The Physiological laboratory dates from 1892. The laboratory of Pharmacology is almost as old and is too small for its present services.

Stockholm is rather difficult to describe. The clinics are widely scattered and of a very different age and general effectiveness. The laboratories housed in the Karolinska Institutet are badly overcrowded, and quite inadequate in point of space and appointments.

A new plan is on foot in Stockholm to build on the western side of the city a new medical center. The site has been definitely chosen and the projected construction is planned first to take care of the clinics and buildings for Pathological Anatomy. Special clinics, such as Psychiatry, Dermatology and Neuro-Pathology, are not included in the first stage of building. Also the theoretical institutes must wait. The Government of Sweden would give the ground if the City and Province of Stockholm approves and promises good buildings and maintenance. The government would pay for 375 beds to be built if the City would pay for 315, and the Province for 110. The scheme for maintenance is that the Province would pay what it costs for a patient in a local hospital minus what a patient could contribute. The State would further pay for teaching and research work as it occurs in the hospital. It is immediately clear that with the existent clinical facilities in Stockholm, the success

of a new teaching hospital would depend, in part, if not largely, upon the willingness of patients, outside of Stockholm, to come to the city for hospitalization. There are those who are very doubtful as to whether patients of this category would come in very large numbers. The existent hospitals in Stockholm include the General Children's Hospital (85-100 beds), the St. Goran Hospital (250 beds), Skin and Venereal Diseases, Sabbatsberg, a General Hospital, a special Orthopedic Hospital of 62 beds, the Serafimerlazarett (452 beds), and the Mariasjukhuset of 160 beds in surgery and 115 in medicine.

HOSPITAL RELATIONSHIPS

In considering the relationship between the medical faculties and the hospitals it is of interest to note that already in 1700 the University of Upsala set up an Out-patient Department for the training of students, which was probably one of the very first of its kind organized at any medical school. In 1752, a General Hospital for the whole of Sweden was inaugurated in Stockholm. It was under the trust of the Knights of the Seraphim Order, and was named Serafimerlazarett, - "Lazarett" meaning in Swedish a general hospital for bodily disease in contrast to the word "hospital" which has the sense of our word "asylum".

The number of beds scattered among the different services at Lund is 728, at Upsala 585. The Serafimerlazarett has 452 beds, but the other hospitals of Stockholm would bring the total teaching facilities in Stockholm up to a thousand.

The Karolinska Institutet, in its relation to various hospitals in Stockholm, has the right to nominate the professor-in-chief of the service and, in most cases, this means also the staff under him.

One half of the hospital costs, in the case of the two university faculties, is carried by the Ministry of Ecclesiastics and Education. Birch-Lindgren is the architect of several of the provincial hospitals, and is familiar with conditions in many parts of Sweden. In his opinion it is doubtful whether such hospitals as the one projected in Stockholm for the Karolinska Institutet will be able to secure a large enough number of

patients from outside of Stockholm since the local so-called cottage hospitals, plus the provincial hospitals, are constantly improving both in facilities and perhaps also in staff. This difficulty would apply principally only to a general hospital, since it is widely recognized in Sweden that the government must assist in the transportation of special cases to special hospitals. Now, there are several special hospitals in Stockholm which have a surer future than a general hospital for the Karolinska Institutet would have.

The outstanding features of the teaching hospitals in Sweden are four: 1) Excellent nursing care and low cost, which does not exceed 10 Kronen in private rooms; 2) Even the ^{pay} patients in hospitals are protected by the official limitation of the fees that may be charged; no fee for a surgical operation may exceed 300 Kronen and the maximum for appendix operation is 50 Kronen; 3) Middle-class patients may attend the Out-patient Department and may be charged by the physician in attendance a direct fee for his professional services; in this way the facilities for which the community has been taxed are put at the disposal of the community; 4) It was the general impression that the teaching hospitals are under-staffed with medical personnel. There is very little opportunity for investigative work on the part of the younger doctors.

CURRICULUM

Students entering the medical faculties in Sweden come from two types of schools, one comparable to the Realschule, in which Physics and Chemistry have been given for at least one year; boys coming from these schools must take an entrance examination. The other type of school is described as being half-classical, presumably a compromise with the old Gymnasium. From these schools an entrance examination is not necessary, but the graduates take a special course at the University before being registered as full-pledged medical students.

There have been no significant changes in the curriculum of the Swedish medical schools of late, and in the main the curriculum follows the regulations of 1907. It is sharply divided into two parts - pre-clinical and clinical. During the first $3\frac{1}{2}$ - 4 years, the student's attention is taken entirely with the pre-clinical sciences of Anatomy and Embryology, Histology, - which is taught usually separately from Anatomy although at the same time, - Physiology, Medical Chemistry, Pharmacology and Pathology - in which is included General Pathology and Bacteriology.

One term is given to Comparative Anatomy and General Chemistry. After that the students dissect the human body during three terms. In the meantime they also take microscopical anatomy. In each of the following terms, Physiology, Physiological Chemistry and Pathological Anatomy are taken. During one of these three terms also a course of

pharmacology is passed. The courses in Physiology and Physiological Chemistry are combined with extensive laboratory practice. In teaching General Pathology stress is laid on the opportunity for the students to get rich opportunities to attend post-mortem examinations. After completing individual examinations in each of these courses satisfactorily, the student appears before the examination session of the faculty, and the degree of Kandidat is formally conferred upon him.

He then begins the second half of his medical education - a period of time that at the minimum is $4\frac{1}{2}$ years and may extend longer. First, before taking any other prescribed course or practical work, the student must spend two months in all in the propaedeutic courses of the medical or surgical clinics, studying the principal methods of surgical technique, clinical examination and general care of the sick. He then, during a period of four months, must take a service in Pathological Anatomy with, at the same time, clinical work in Medicine and Surgery.

In the clinical work each patient is turned over to a student who makes the examination and writes up a history, the completeness of which varies with the nature of the case. Suitable cases are used for demonstrations at the clinical lectures; at this time the professor reads the student's report aloud and makes his remarks on it, also checking up the correctness of the student's physical examination. The students then have permission to examine the patient after which the patient is taken away and the professor gives a clinical discussion of the case (diagnosis, prognosis, therapy). Two or three cases are often

taken up in a single lecture, a "clinical lecture" usually lasting several hours. When the student is more advanced he has to write special discussions which are at times read and commented on at the lecture. The professor precedes his discussion by presenting in brief, results of laboratory examinations, etc., on the case. All the students have to attend the professor's clinical reception of patients, and make notes on the new cases. Instruction at this time is in question and answer form. The student is throughout required to make many examinations of patients, but these are checked up by the assistant physicians. The professors try to arrange the theoretical work to be undertaken next by the student.

In addition to the four months service in Medicine and four months in Surgery referred to above, the student must take, simultaneously or later, a two months clinical course in Neurology, two months service as assistant in the Medical Clinic and one month as an assistant in a hospital for infectious diseases. In Pediatrics, he must take a three months service in a Pediatrival clinic. In Surgery, in addition to the four months service mentioned above, he must have a two months course in Otology, Rhinology and Laryngology, and one month service as Surgical assistant in a Surgical clinic. For Ophthalmology, two months service in a clinic is required. For Obstetrics and Gynecology - four months. In Pathological Anatomy, it has been already noted that four months service is required, simultaneously with the service in the medical or surgical clinic. Two months additional service in the Pathological

Institute is usually done at the time of being assistant in the medical clinic. In Legal and State Medicine, a three months course is given after the termination of services in Medicine and Surgery, Gynecology and Obstetrics. Thus, this three months course is at the termination of the medical studies. Furthermore, in Psychiatry, there is a short lecture course in the Psychiatric clinic. In Dermatology and Syphilology, a two months course, not given in Lund or in Upsala but only at St.Göran's Hospital in Stockholm. In Syphilology, in addition to two months lecture course, (lecture and clinic) there is a two weeks service as assistant, which does not, however, amount to much. In Hygiene, there is a two months course consisting largely of lectures and field trips. The clinical training is completed by two or more months of the so-called "assistant service" in which the student takes a more complete responsibility for cases. In medicine this service is at least two months, in surgery at least one month.

Having finished all this training in different departments the student has to pass special final examinations in internal medicine, surgery, pathological anatomy, ophthalmistics, pediatrics, obstetrics and gynecology, forensic medicine, syphilidology, psychiatry and public health. After these separate examinations he is declared "medicine licentiate" and immediately afterwards he will, by the state board of medicine, get his licence for practice. These clinical courses lead to the degree of Licenciator. For the degree of Doctor of Medicine, the Licenciate must first be obtained, and the applicant must choose,

write and publicly defend a thesis approved by the faculty.

The students are obliged at the termination of their work at the University to serve in certain hospitals in addition to their work in the university clinics. This is the so-called practical year which is obligatory for some state appointments, and the hospitals in which it may be accomplished are chosen by fixed rules of the Medical Administration in Sweden. It should be noted also that in the case of Dermatology, there is neither at Lund nor in Upsala a satisfactory service, so that the Dermatological Clinic in Stockholm is the only place where students can receive satisfactory experience.

The student must take his lecture work and practical work in each subject at the same time, and the possibilities of combining different subjects during the time of practical service are very slight. Ophthalmology and Psychiatry may be taken simultaneously; Hygiene and Legal Medicine may also be combined and the Neurology lecture course taken at the same time as the practical work in Syphilology or Pediatrics, but this about exhausts the possibilities. The "continuation course" in medicine and surgery may be taken only in Stockholm or Lund; the Legal Medicine, Syphilis Clinic, and Neurology course only in Stockholm; all the other work may be taken at any of these three schools.

As one of the outstanding features of the Swedish curriculum is the length of time involved, I tabulated the information given in the Catalogue of the University of Lund Medical Faculty, and found that in May 1929, there were following number of students still taking courses for the Licentiate who had entered in the years noted as follows:-

1915	-	1
1916	-	1
1917	-	8
1918	-	9
1919	-	23
1920	-	33
1921	-	37
1922	-	33
1923	-	34
1924	-	31
1925	-	41
1926	-	53
1927	-	43
1928	-	95
1929	-	13

This brief table indicates that, apart from the few stragglers, the medical course takes about 10 years. The number is slightly diminished in the last year or so of study, since some of the men leave Lund to take the degree in Stockholm.

I further carefully examined the Catalogue of Lund to see at what age Swedish medical students were beginning so long a period of training. 10 had entered the Medical Faculty at the age of 17; 85 at 18; 131 at 19; 93 at 20; 62 at 21; 26 at 22; 23 at 23; 9 at 24; 9 at 25; 4 at 26; 2 at 27 and 4 at 28.

TEACHING METHODS.

The teaching methods in Sweden are characterized by thoroughness and length of time given for each course of instruction and by the fact that the teaching is more practical and more closely controlled by professor or instructor than in Germany, and yet more academic than is the case in the faculties of England or France.

Classes are not large. It is rare to have over 100 students. The number of assistant teachers is reasonably large, but perhaps not quite sufficient. There is considerable emphasis upon individual laboratory work and there is everywhere clear evidence that such laboratory work is carefully controlled.

One receives the impression that, thanks to the elasticity of organization in the curriculum and the length of time usually accorded to medical studies, there is very little cramming or hasty memorizing and that the students, realizing how long is the study of medicine, are going at it in a patient, slow and sound way. The equipment without being luxurious, is adequate. It is perhaps unusual to see so little discrepancy between the quality of the work done in different institutes of the same faculty. In the pre-clinical studies there is, in general, a sane balance between lecture, demonstration and individual work. Increased emphasis during the past 15 years has been placed upon the Physiological side somewhat at the expense of pure Morphology. Through the sharp differentiation which is marked by the Kandidat examination at the end of the first four to five years, the clinical courses obtain a certain

distinction and maturity of point of view which is not common in most other countries of Europe. And the clinical course being taken in a slow and thorough way produces a graduate from the medical faculty whose clinical experience, not only in the "tripod of medicine", but in the specialties is as good as any in Europe. A few notes on teaching methods in some of the representative institutes or clinics may be useful as giving typical examples of conditions observed:

Anatomy (at Lund):-

Anatomy is taught together with Embryology. Histology is taught at the same time of the student's career but by another professor. Owing to a lack of material, and as a matter also of pedagogic method, students are obliged, before doing any dissection themselves, to study dissected preparations and pass a rigid examination upon them. Thereafter, each student dissects each part of the body once. Four semesters are given to Anatomy and Embryology. The professor is assisted by student assistants, who are given the title of "Amanuens". These are young fellows who have already passed the Kandidat examen and are well in advance of the other students. Scattered among the four semesters there are 200 students, half of whom are dissecting new material. In this way the 50 cadavers available are made to serve satisfactorily for a large number of students.

Physiology (at Lund) :-

The classes number about 20. The course is given twice a year. For two and a half months the students spend all day in physiology. They

are obliged to keep "Journals" which have records of experiments made that are among the best that I have seen anywhere. The selection of themes for experimental verification is broad and careful. Four times a week during this course the professor gives a lecture followed or accompanied by a demonstration, the whole taking about two hours. Once a week the lecture is given by the first assistant. The teaching force is composed of: the professor, first assistant, an "amanuens" and two extra or subordinate "amanuenses".

Internal Medicine (at Lund) :-

Internal Medicine begins after the Kandidat's examination, i.e. when entire pre-clinical work is finished satisfactorily. The first course in Medicine is a six months systematic course of lectures. There follows two months in medicine and two months in surgery devoted to physical diagnosis and nursing. Then comes a five months course all day, every day in the week, in the medical clinics, with three clinical lectures a week. During this time the students are at work as clinical clerks, and are obliged to keep full records of their cases which are reviewed by the assistant and returned to the student with corrections and suggestions. A further course of two months as intern with responsibility for cases and for the histories taken upon them, completes the training.

Obstetrics and Gynecology (at Lund) :-

The course begins with two weeks of introductory lectures and reading. There is also work on the phantom and attendance at normal cases delivered in hospital. The class is then divided into sections; eight

students at a time live in the hospital for four months and do nothing but the work of obstetrical clinic. Two of this team of eight are on duty for twenty-four hours at a time, every four days, and during this time food is provided for them and they live substantially as interns. They begin with delivering normal cases under the supervision of an assistant. There is always on duty a trained midwife as nurse. Each student gets 45-50 deliveries under these conditions, together with attendance at abnormal cases, and ward-rounds, and experience in handling the routine laboratory work. The hospital is one of 108 beds with possibility of change in the proportion between obstetrical and gynecological cases. There are about 1900 births a year.

General Pathology (at Stockholm) :-

About 50 students in a class. The course is repeated twice a year. It lasts two and a half months and is given just before the Kandidat examination. There are lectures and demonstrations but no individual laboratory work. The material from some 350 autopsies is divided among the class for careful study. The course acts as a stepping-stone between Physiology or Pathological anatomy, and the clinical work soon to follow. The staff is composed of professor, one prosector and two assistants.

Orthopedics (in Stockholm) :-

A two-months course which is repeated three times in the year. There is a general course of lectures by the professor, a practical course in bandaging and orthopedic technique by the first assistant. No operating experience is given to students since this is reserved for the assistants.

There are from 20 to 30 students per course. The staff consists of: first assistant, who stays a term of six years; a second assistant, who stays for two years, and a third assistant, who is on a one-year appointment.

Medicine. (at Stockholm):-

Medicine at Stockholm is much as it is at Lund. There is definitely more bedside work in the medical teaching than is the case in Germany, and the cases are thoroughly discussed in small groups. The best preparation for the work in medicine is considered to be the post of second assistant, in either pathology or physiology, previous to taking the course in medicine. This is, of course, reserved for very few, but in general, in Sweden, the custom of having student assistants in nearly all of the courses serves to select and further train the most promising material.

Medicine (at Upsala) :-

The medical course has 150 free beds, 24 private beds. There are about 10 new cases in the Polyclinic per day. The professor has four assistants who stay with him 4 to 5 years each. The course begins with seven weeks introduction in the chest clinic for a general review of pathology and for training in physical diagnosis. Then follows a 15 weeks course including ward-visits and systematic lectures. Then 12 students at a time are taken as assistants on the ward for four months each; the usual "journals" or records of cases are carefully kept and criticized by staff assistants.

Hygiene (at Upsala)

About 30 students take a two months course, 2 hours lecture and demonstration, five times a week, in addition making visits to sewage disposal plants, etc. If the marks of a student are unsatisfactory, he is required to make special reports on schools, hospitals and other institutes related to Public Hygiene, until his comprehension of the subject is considered to have been improved.

Every 3-4 years, when ten to fifteen provincial doctors join together in asking for a special course, Professor Wirgin gives such a course for six months. It is of the seminar type, consisting of lectures, , a long excursion and criticisms of studies prepared by students of special institutions or statistical studies.

EXAMINATIONS AND LICENSURE

At the end of each course a Tentamen, or examination for the course, is given. This is usually practical and oral, and lasts for $1\frac{1}{2}$ -2 hours. At the end of $3\frac{1}{2}$ -4 years a general examination is given - the so-called Kandidats-Examen. This in effect covers all of the pre-clinical subjects in the medical curriculum. If a student fails in one of the tentamens, he is remanded for further study and can take the examination again without taking the course over. It is left for him to decide when he will present himself. By spreading the tentamen examinations over the year, the professors are relieved of a great accumulation of examinations.

Following the Kandidats-Examen, the successful examinee has the title of Kandidat and pursues, for another six to seven years, his studies, this time, however, entirely in clinical branches. He is then given a final examination for the Licenciate and, if successful, he may file his certificate of being a Licenciator with the State Board of Medical Control which, without further examination, gives him the licence to practice medicine in Sweden.

After this university work and before obtaining his degree as Licenciator, he must, if he is to take any government or local post, work as assistant eight months in a hospital approved by the Karolinska Institutet, the University of Lund or of Upsala, in a medical, surgical or mixed service. Since these posts provide both room and board free, this terminal clinical year is not a severe burden to the student.

In the point of different degrees, the three medical schools of Sweden are related in a peculiar way due to the fact that the universities of Lund and Upsala are obliged to limit the number of clinical students to 30, whereas the hospital facilities in Stockholm are much more abundant. Consequently, out of 442 clinical students at Stockholm, we see that 283 have been prepared in Stockholm, that 118 are from Upsala and 41 from Lund. The students who remain in the clinics at Upsala or Lund, are neither better nor worse than those leaving for Stockholm, since many other factors besides intellectual qualifications determine their decisions in this point.

The clinical facilities in Stockholm are such as to draw some men from Lund and Upsala. This is indicated by the figures for Stockholm in 1928. There were 384 medical students in the first half of their medical training, i.e. previous to receiving the degree of Kandidat. There were 544 students in the second half of their medical studies, and this increase was due to additions from Lund and Upsala, Upsala sending about 118 men and Lund 41.

COST TO STUDENTS

Taking ten years as an average length of the medical training, the student's expenses for this period are calculated as being between 30,000 and 40,000 Kronen. This includes university charges, together with living expenses. The laboratory fees for the pre-clinical courses total 3-4,000 Kronen. Although the Krone has the value of 3,72 Kronen to the Dollar, I was told that 2,70 was the buying value in Sweden of one Dollar in America. Many of the students go into debt. Indeed for 145 Swedish physicians licenced in 1920-21, the following table from the "Meddelander från Medicinska Forenningen" 1923, No. 4, gives as having

No debts	27%
Less than 10,000 Kr.	23%
From 10 to 20,000	24%
" 20 to 40,000	21%
" 40,000 or above	5%

The best rate obtainable for borrowing money from the banks is $4\frac{1}{2}\%$. The usual rate is 5% and it is noteworthy that a very considerable number of student loans are furnished by the banks. Bankers consider that the character and financial position of practitioners in Sweden is such that they may safely place money upon a large number of medical students.

SELECTION AND RECOMPENSE OF TEACHERS

The professors are chosen only from the Dozent class. This is already a selected group, since only 2-4% of those whom we should call graduates in medicine, and who are known in Sweden as Licenciators, go on to take the higher degree of Doctor of Medicine, and not more than half of the doctors of medicine attain the Dozentship. Furthermore, in the examination for the Dozentship, which consists of a prepared lecture and test of practical work, manipulation, etc., the successful candidates must have a mark of 2 or more on a scale of 3. Direct calls to the professorship are few. The judges appointed to choose professors for vacant chairs are nominated by the Faculty, the University Konsistorium and the Chancellor. It is a committee of 4-5 judges, which usually includes a Dane or a Norwegian or a Finn. To this committee the candidate for the chair must present his thesis. Each member of the committee is obliged to read all of the published scientific works of every candidate, which takes considerable time, but finally the committee select and publish (with reasons given) in the order of their preference, three names which are then presented to the faculty and, when approved, to the University Senate, and again to the Chancellor of the Universities and to the Minister of Public Instruction. It is rare that reversals of judgement take place, and the candidate having first preference is usually nominated. It is said that "when you know the committee you know who will be their first choice".

Men arrive at the chairs of medical faculties of Sweden at about the age of 45. It is definitely stipulated that all professors in Sweden shall be chosen on the basis of the following three qualifications:

- 1) Scientific ability as an investigator,
- 2) Ability as a teacher of medicine, and
- 3) Youth, i.e. in case of choice between two

candidates the younger man shall be favoured.

This policy is adhered to with a good deal of tenacity and the publication of the committee's decision is a custom which aids in observing the three qualifications mentioned.

In practice this method of selection of professors works extraordinarily well if one may attribute to it the quality of the professors in Sweden at present. The presence of a Dane or a Norwegian on the committee helps occasionally to guarantee freedom from local political considerations. The difference from the method in force in Denmark is that candidates for the professorships are not obliged in Sweden to take part in an open contest, such as presentation of a lecture on short notice, etc. I cannot avoid the conclusion that the requirement which submits all of the published work of any candidate to the searching examination of a group of his professorial confrères acts as a deterrent to hasty or voluminous though shallow publications on the part of any young Swede who is contemplating a university career. Another item in the method of selecting professors, which is of some importance, is that the committee is obliged to publish their choice and give the specific reasons for their

choice. This directly acts as a control of criticisms that might be made of any bias, favouritism, etc. In the examination for the Dozentship, there is a curious feature which dates, it is said, from the Middle Ages. The prospective Dozent is obliged to defend his thesis for three hours before a public assembly as well as one critic appointed by the faculty and two critics chosen by himself. I attended one of these examinations. It was extremely formal and the technical discussion appeared to be rigorous. It has been found, apparently since the Middle Ages, that this ceremony tends to become overcharged with emotion, and hence it has become the custom that of the two critics chosen by the Dozent one is likely to be a local wit, often having no technical qualifications for the discussions of the thesis. His function in the ceremony is to bring the entire discussion within the bounds of reason and general common-sense. Since the thesis must have been published at least two weeks before its public defense, he has an opportunity, along with his technical colleagues, to prepare himself upon the subject, but his remarks are intentionally diverting and intended to remove any traces of permanent bitterness or ill-feeling which often accompanies criticisms offered in public by specialists.

The salaries of professors in the medical faculties in Sweden vary from 12,000 to 14,000 Kronen in the Sciences to 15,000 and upward in the clinical branches. Since clinicians receive additional pay for clinical work in the hospitals or from other work which they are able to do, there are no full-time clinical positions. Forsell was of the opinion that the non-clinical professors are very poorly paid. One of his colleagues he knew to be paying 5,000 Kronen only for rent out of a 14,000 Kronen salary.

It requires 3 - 4,000 a year to keep a boy in the medical faculty. The rank of Laborator or, in Anatomy, Prosector, is the equivalent of the Professor extraordinarius in Germany. Laborators receive 10,000 Kronen. First assistants receive 4,000 to 6,000 Kronen.

There are a few fellowships at Lund which are restricted to Dozents and four of which are in force in the medical faculty. These fellowships are tenable for three years and renewable once for three years, and pay 7,000 Kronen thus, serving an excellent purpose since it is widely acknowledged in Sweden that the pay of both the professors and subordinate teaching personnel is inadequate. A curious feature of the arrangements at Lund is that the first assistant in Surgery is allowed to charge for his services in the Out-patient Department and may, in this way, get as much as 15,000 Kronen additional to his 5,000 salary. With the force of tradition behind it, this arrangement continues undisturbed and it has the virtue of securing first-rate talent in the position of first assistant. The "amanuens" (or assistant) receives 315 Kronen monthly from the University during the academic year. Professors in Sweden retire on 70% of their academic salary. Nordensson, in Upsala, told me that his salary as professor of Ophthalmology was 12,000 Kronen and that from one hour's private consultation work a day he receives 6 - 8,000 Kronen a year. The pathologist at Upsala is obliged to do private work in tissue diagnosis apart from his University responsibilities, in order to make 6,000 which is absolutely necessary as an addition to this salary.

PROFESSORS IN STOCKHOLM

Kungl. Karolinska Mediko-Kirurgiska Institutet

LILJESTRAND	Göran	Pharmacology
AKERMAN	Jules H.	Surgery
Vacant:		Physiology
GADELIUS	Bror E.	Psychiatry
DALEN	J. Albin	Ophthalmology
HEDREN	Gunnar	Legal Medicine
HOLMGREN	N. Gunnar	Œtiatry
ALMKVIST	Johan R.	Syphilis
HOLMGREN	Israel	Intern. Medicine
HAGLUND	S.E. Patrik	Orthopedics
JUNDELL	Isak	Pediatrics
FORSSELL	C. Gösta	Med. Radiology
JACOBÆUS	H. Christian	Int. Medicine
FORSNER	Hjalmar	Obstetrics, Gyn.
SJÖQVIST	John A.	Chemistry, Pharmacy
PETERSSON	Alfred	Hygiene
AHLSTRÖM	Erik, O.M.	Obstetrics, Gyn.
HENSCHEN	Folke	Pathol.-Anatomy
WERNSTEDT	Wilhelm E.	Pediatrics
HÄGGVIST	Gösta, P.E.	Histology
KEY	Einar S.H.	Surgery

Professors in Stockholm (continued)

MARCUS	Henry I.	Neurology
BERGSTRAND	K.J. Hilding	Pathol.-Anatomy
HESSER	A. Carl H.	Anatomy

Prosectors

BACKMAN	Gaston (Prof.)	Anatomy
Vacant		Pathol.-Anatomy

Chiefs of Laboratories

KORÅEN	Gunnar M.	Bacteriology
GERTZ	Hans V.	Physiology
HAMMARSTEN	Einar	Chemistry, Pharmacy
OHNELL	H.	Clinical research
REUTERWALL	O.	Pathol.-Anatomy

Lecturers

KINBERG,	Olof V.	Legal Psychiatry
LICHTENSTEIN	Adolf	Epidemiology

Docents

LEVIN	Ernst J.	Bacteriology
JOSEFSON	Arnold R.	Medicine
MOBERG	Ludvig	Dermatology
WALDENSTRÖM	J. Henning	Orthoped. surgery
TROELL	N. Abraham	Surgery

StockholmDocents (continued)

KLING	Karl A. (Prof.)	Serology, Immunology
MARCUS	Karl	Syphilis
TILLGREN	Josua	Medicine
LINDSTEDT	E. Folke	Int. Medicine
SÖDERLUND	N. Gustaf	Surgery
PLOMAN	Karl Gustaf	Ophthalmology
HULT	Olof T.	History of Medicine
REENSTIERNA	John L. (Prof.)	Dermatology, Syphilis
LICHTENSTEIN	Adolf	Pediatrics
SCHAUMANN	Jörgen Nielsen,	Dermatology, Syphilis
HEYMAN	E. James	Obstetrics, Gynecology
ÖHNELL	Harald	Internal Medicine
LINDBOM	E. Oscar	Medicine
BERGLUND	Hilding	Medicine
ANTONI	Nils	Neurology
PERMAN	Einar	Surgery
STRANDBERG	James V.	Dermatology, Syphilis
FAHRAEUS	Robin S.	Experim.-Pathology
LUNDQVIST	Birger	Obstetrics, Gyn.
MALMBERG	Nils M.	Pediatrics
HÖJER	J. Alex	Experim. Pathology
STENSTRÖM	Nils	Medicine
SAHLGREN	Ernst	Neurology

PROFESSORS IN UPSALA

Medical Faculty

MÖRNER	Karl Tore Graf	Medicine and Physiol.- Chemistry
QUENSEL	Johan Ulrik Teodor	Pathol.- Anatomy
WIRGIN	Germund	Hygiene, Bacteriology
BERGMARK	Gustaf	Practical medicine
GÖTHLIN	Gustaf Fredrik	Physiology
NYSTRÖM	Erik Gunnar	Surgery
THORLING	Anders Ivar	Pediatrics
OLOW	John Olof	Obstetrics, Gynecology
BACKMAN	E. Louis	Pharmacognosy
BARANY	Robert	Oto-Rhino-Laryngology
AGDUHR	Erik	Histology, Embryology
NORDENSON	J. W.	Ophthalmology

Chiefs of Laboratories

AHLGREN	Johan Gunnar	Exp. Physiology, med. Physics
ELIX	Gunnar Frithiof	Med. physiol. chemistry
LAURELL	Hugo Fredrik	Med. Radiology
Vacant:	Anatomy & Exp. Pathology

UpsalaMedical Faculty (continued)D o c e n t s

SJÖBRING	Per Henrik Nils	Psychiatry
NÆSLUND	Carl, Albert	Hygiene, Bacteriology
HÄGGSTRÖM	Paul Robert	Surgery
KRISTENSON	Anders Vilhelm	Pract. medicine
NÆSLUND	John Petrus	Pathol.-Anatomy
BJURÉ	Johan Alfred	Pract. medicine
SUNDBERG	Carl Gustaf	Physiology
DOHLMAN	Gösta Fritz	Oto-Rhino-Laryngology
DAHLBERG	Gunnar	Eugenics
BOSÆUS	Wilhelm Birger	Pathol.-Anatomy

PROFESSORS IN LUND

Kungl. Karolinska Universitetet

Medical Faculty

FORSSMAN	Magnus John Carl Aug.	Gen.Pathol. Bacteriology Hygiene
ESSEN-MÖLLER	Gustaf Elis	Obstetrics, Gynecology
BROMAN	Ivar	Anatomy
THUNBERG	Torsten Ludvig	Physiology
OVERTON	Charles Ernest	Pharmacology
SJÖVALL	Per Gustaf Einar	Pathol.-Anatomy, Legal Medicine
KLERCKER	Rutger Kjell Otto	Pediatrics, Pract.Med.
PETREN	Erik Gustaf	Surgery
WIDMARK	Erik Matteo Prochet	Med. & Phys. Chemistry
HELLMAN	Torsten J.son	Anatomy, Histology & Histogeny
WIGERT	Victor Hjalmar Hugo	Psychiatry
Vacant:	1 professor for.....	Pract. medicine
A S K	Fritz Gustaf	Ophthalmology

D o c e n t s

TÖRNE	Frans Vilhelm	Oto-Rhino-Laryngology
HOLMDAHL	David Edvard	Anatomy

Medical Faculty (continued)Docents (continued)

EDLING	Lars Henrik August	Med. Radiology
INGVAR	Sven	Neurology
LJUNGGREN	Gustaf Axel Carlsson	Chemistry
LINDAU	Arvid Wilhelm	Pathol.-Anatomy
HÖJER	Johan Axel	Hygiene
SIWE	Sture August	Anatomy
ENGHOFF	Sven Albert Henrik	Physiology
BERGGREN	Sven Sture	Oto-Rhino-Laryngology

GENERAL REMARKS ON RESEARCH

Research in the medical sciences in Sweden, although it encounters some difficulties which will be diminished eventually, is on the whole a phase of medical school work to which much attention is given and which compares favourably in quality with what is done anywhere else in the world. The great emphasis upon scientific research which is explicitly stated in the regulations for the choice of professors, appears to have had a palpable effect. The Swede in temperament is rather more likely to be slow, steady and late-maturing than are his colleagues further south in Europe. I had the impression from most of those with whom I talked that their individual interests were deep and permanent.

It is, in my opinion, an excellent rule in their scheme for selecting professors which provides that all of the published work of

It may be useful to note that the problem of publication of research work is met in a rather satisfactory way by the Karolinska Institutet, which undertakes the publications of the following journals:

Acta Medica Scandinavica
Acta Chirurgica Scandinavica
Acta Oto-Laryngologica
Acta Dermato-Venereologica
Acta Paediatrica
Acta Radiologica
Acta Gynecologica

any candidate for a professorship must be read by all of the members of the selection committee. This has, I was told, (and I can well believe it) a definite effect upon the young Dozent who contemplates an academic career. It makes him prefer to publish through, compact and careful papers, more probably upon related themes, and to set less value upon hurried communications put out for the sake of securing recognized priority. At any rate, the production of medical literature in Sweden is within moderate limits and the quality of the papers, on the whole, is quite superior to those either in France, Germany, Austria or Italy.

There is one characteristic phase of Scandinavian medicine which is worth recalling in a consideration of research work in Sweden. This is the fact that a wide-spread and, in many cases, thorough familiarity with from one to three other languages than Swedish, is usually met with, and consequently a professor in Sweden is unusually well informed regarding the literature or current activity in at least one and frequently three other countries than his own.

Professor Barany, whose thorough familiarity with Vienna in pre-war times enables him to make a comparison from a more thorough knowledge than is usually possible, made the following comments upon research and teaching in Sweden:- The preparation for the practice of medicine is better done in Sweden than anywhere in Austria or Germany. The difficulties in research work are two, (and this referred more particularly to Upsala). There is much prejudice against animal

experimentation. There is no place provided even to keep animals. Physiology, Pharmacology, Medicine, Surgery and Pathology all suffer from inadequate accommodations for animal experiments. The second obstacle to research work lies in the fact that the financial status of the physician in Sweden is so good that scientific work is less attractive as a career than, for example, in Germany where scientific distinction possesses not only intellectual but financial recompense. Barany further believes that the medical course in Sweden is so long that the time of a man whose interests are special and crystallized somewhat early is wasted in getting the regular degree. My own impression is that these difficulties are by no means insuperable. One hears occasionally that so strong is the emphasis upon scientific attainment as a qualification for professorships, that good teachers of only moderate research ability are again and again passed over and lost to the teaching force of the faculties. Inadequate budgets for investigative work together with meager salaries for scientists, and especially the younger scientists, appear to me to be more directly a hindrance to medical research in Sweden than any other factors. This is borne out by the universal acknowledgement of the fact that, if it were not for the Johann Anderssons Fond, investigative work in Sweden would be at a standstill.

RESEARCH BY SUBJECTS

I should like to present under the headings of different medical disciplines the names of men whom I met or of whom I heard a great deal, indicating their special interests and such useful information as I was able to obtain regarding them. My impression is that previous surveys have neglected this method of recording impressions received during visits. I am furthermore inclined to think that this information is perhaps of more use for subsequent reference than almost any other single item that could be presented in a survey.

Anatomy and Embryology

Ivar BROMAN

Born 1868. Professor at Lund since 1901. Especially interested in Embryology. Has a collection of 100 human embryos down to 2-3 mm. which he referred to as being his life work and which is unfortunately not protected against the risk of fire. His laboratory facilities are rather limited, and the building is old. In addition to human embryos he has a large collection of specimens in comparative embryology. Broman is a friend of Moll and Duesberg. Special interest: comparative vertebrate embryology. Largest collection of seal embryos in the world. Speaks German and English.

Erik AGDUHR

Born 1886. Professor at Upsala since 1926. Agduhr is professor of Anatomy and has teaching responsibility also for teaching of Histology and Embryology. At the present time Agduhr's quarters are inadequate, but the next building project in Upsala will include an extension and renovation of his quarters. Agduhr is one of the few examples of a professor in the medical faculty whose training has been largely in the faculty of veterinary medicine. This gives him a wider point of view in that he is familiar with comparative anatomy, histology and embryology. He is distinctly interested in experimental work, and has published valuable papers on the histology of the nervous system. Also has done some interesting work on apparently toxic substances in cod liver oil. Speaks a little English and German.

Histology

Gösta HAGGQUIST. Born 1891. Professor at Stockholm in 1923. Speaks English and German. Pupil of Holmgren and Broman. Pure morphologist. Interested in histology of muscles. Apparently no pupils and very little activity in the laboratory. Large collection from the time of Retzius.

Physiology

Thorsten Ludvig THUNBERG Born in 1873. Professor at Lund in 1905. Pupil of Hammersten and Holmgren. An excellent teacher. Has worked much on the physiology of special senses, but is now especially interested in oxidation phenomena, especially in Wieland's hypothesis, and the methylin-blue test. English and German.

Gustaf Fredrik GOTHLIN Born 1874. Professor at Upsala in 1918. Has done accurate and very carefully controlled work on the physiology of vision with instruments designed by himself. The Medical Board of Sweden recently entrusted to Gothlin the study of Vitamin C. in Northern wild berries, as a possible control for certain nutritional disorders in Northern Sweden. G. has two or three excellent assistants and though the building that he is in was erected in 1886, the laboratory gives an impression of orderly, careful and intelligent management. G. speaks English and German.

Pharmacology

Charles Ernest OVERTON Born 1865. Professor at Lund in 1907. Speaks German and English. An Englishman by birth, long a pupil of von Frey. Retiring in two years. Studied intensively for the past ten or fifteen years the role of different esters in producing narcosis. He has a curious failing of finding publications almost impossibly difficult. Possesses voluminous notes on extraordinarily long series of experiments. Has used a large part of his budget for the purchase of esters of weaker acids. He does not wish either assistants or students.

Eugene Louis BACKMAN Born 1883. Professor at Upsala - 1925. Occupies very cramped quarters but is much devoted to a group of 10 or 15 "Candidates" i.e. men still in their clinical years, to which he assigns short problems which are done under his close supervision. The State budget is such as to cover only light and heating of his small laboratory. He obtains from the Johann Anderssons Fond the rest of his budget for his work. He is hard-working and unselfish towards these younger men. Probably a valuable man for students in their earlier years of investigative work. Not equipped for advanced students.

Pharmacology (continued)

Göran Liljestrand

Born in 1886. Professor at Stockholm - 1927. Laboratory entirely inadequate for receiving other workers. Principally a question of space. Liljestrand is Secretary of the Nobel Prize Committee and is consequently very familiar with medical science in many countries. Gives me the impression that the medical sciences in the Karolinska Institutet are isolated and depressed. Speaks German and English and, I believe, French.

Einar HAMMERSTEN

Born in 1889. Professor in Stockholm - 1928. Pharmacology is here combined with Chemistry. Hammerston's quarters badly overcrowded but extremely busy. H. like Liljestrand is a capable scientist working under great difficulties. Gives me the impression of being seriously ill (I was later told that he had endocarditis). Speaks English and German.

Bio-Chemistry

Erik WIDMARK

Born in 1889. Professor in 1920 (at Lund). Has excellent quarters in new building. The youngest professor at Lund, capable and willing to receive advanced students. Successor of Bang, pupil of Thunberg. Speaks English and German. Interested in alcohol absorption and micro-methods for detection of alcohol in blood. Budget about 9,000 Kronen - 3,000 from State, 3,000 supplementary from State and 3,000 from laboratory fees.

Pathological Anatomy

Gustaf SJOVALL.

Born in 1879. Professor at Lund in 1914. Absent during my visit. Laboratory fairly active. Excellent assistant (Lindau). (For description of laboratory see "Methods and Problems").

Hilding BERGSTRAND

Born in 1886. Professor at Stockholm in 1924. Speaks English and German. Interested in isolation of bacteriophage by high power centrifuge. Studied with Ross Harrison in New Haven. Friend of Fahreus and Gunnar Holmgren. Active and ambitious. Not possessing, however, very good facilities for advanced work at present.

Pathological Anatomy (continued)

Folke HENSCHEN

Born in 1881. Professor at Stockholm in 1920. Speaks French and German. Quarters at the Karolinska Institutet; buildings are too small. Not a large amount of pathological material. Henschen is a great admirer of Danes. Especially interested in blood-forming organs and in comparative pathology.

General Pathology

Magnus FORSSMAN

Born 1868. Professor at Lund in 1900. The senior professor at Lund. Especially interested in bacteriology. Director of a hospital and the leading figure in Lund. Was unfortunately ill at the time of my visit.

Robin Sanno FAHRÆUS

Born 1888. Professor in 1928 (Upsala). There is no professor in pathological anatomy at the present time, only an assistant professor with the Swedish title of Laborator, whose name is Wilhelm Birger BOSÆUS, so that to F. falls the responsibility of leading in the general field of Pathology at Upsala. F. has distinguished himself as being the first to call attention to the phenomena of sedimentation of red blood corpuscles in different diseases and in different animals. Very favourable impression, in addition to the uncommonly high commendation from several people in Lund and Stockholm, including Forsell. Fahreus had a stipend from the Johann Andersson Fond of 19,000 Kronen a year, before coming to Upsala. He now has 12,000. Tries to do what he can privately with tissue diagnosis from practising physicians.

Bacteriology

Arvid LINDAU

Born 1892. Dozent in 1926 (Lund). Speaks English and German. Pupil of Sjövall and Forssman. Studied with Aschoff. Highly recommended by Harvey Cushing for his work on cerebral angiomas. Is to work in 1930 with Madsen in Copenhagen. Interested also in other forms of brain tumors and in bacteriology. A very probable candidate to succeed Forssman who retires in five years.

Carl A. KLING

Born 1879. Dozent in Serology and Immunology in 1919. At present Chief of the State Bacteriological Laboratory. (Stockholm). I did not meet Kling but heard from numerous people the very high opinion which is held of him. Especially interested in vaccination for varicella, and in infantile paralysis and encephalitis lethargica. Pupil of Oscar Medin. Has collaborated with Levaditi on polyomyelitis.

Internal Medicine

Sven Ingvar INGVAR Born 1889. Dozent in 1925. Speaks English and German. Pupil of Karl Petré, Harrison of New Haven, Brouwer and Kappers of Amsterdam. Knows Stanley Cobb and de Jong. Especially interested in neurological ontogenetics in neuro-pathology especially of mid-brain and in the meningitis phenomena of Zoster and Tabes. Is substituting as the chief of the medical clinic until the selection of Professor Petré's successor. He is the leading candidate for this position. Ingvar is definitely interested in research in connection with clinical problems.

Gustaf BERGMARK Born 1881. Professor at Upsala in 1921. I did not have the impression that B. was particularly active in investigative work, nor that he was, in general, quite equal to some of his other colleagues in Upsala.

Israel HOLMGREN Born 1871. Professor at Stockholm in 1913. Speaks English, German and French. Interested in tuberculosis therapy and in surgical problems. Quite familiar with foreign medical practice. Birch-Lindgren finds him progressive and original but probably very obstinate. My impression was that he was quite isolated at the present time in the Karolinska Institutet, and certainly not close to either Forsell or Key, but good critical judgement and independent.

H.J.C. JACOBÆUS Born 1879. Professor at Stockholm in 1916. Especially interested in chest diseases. Has devised a method of cutting pleural adhesions through trocars as a part of pneumo-thorax treatment. Speaks English, French and German.

Surgery

Erik Gunnar NYSTROM Born 1877. Professor at Upsala 1921. Pupil of Lenander. Worked also for a year at the Mayo Clinic in 1905. Speaks excellent English as well as German. Has a new surgical clinic built in 1923, beautifully built and maintained. Is younger than his years indicate, and apparently occupies a position of considerable importance in the University. Is Director of the University hospital. N. would be, I think, the best adviser on surgical matters in Sweden. Is interested in experimental work and his university position gives him a better opportunity to follow and direct research work than is the case with most of the men in Stockholm.

Surgery (cont'd)

Einar KEY

Born 1872. Professor in 1923 (Stockholm). Speaks English and German. Interested in renal surgery and surgery of blood vessels, also in thoraco-plastics. Director of the Mariasjukhus. Interested in hospital construction and management. Birch-Lindgren thinks that in this he is intensely conservative. Had Augustus Thorndike of Boston as pupil in about 1926. Not ideal circumstances for surgical investigative work or advanced teaching. For this, perhaps, I would prefer Nyström at Upsala.

A. H. OLIVECRONA

Born 1891. Dozent 1924 (Stockholm). Interested in brain surgery for which he has a small section of 12 beds at the Serafimerlazarett. Very little teaching but excellent records of his cases, for the maintenance of which he receives grants from the Johann Anderssons Fond. Speaks English and German.

Obstetrics and Gynecology

Gustaf ESSEN-MOLLER

Born 1870. Professor in 1901 (Lund). Speaks English, German and French. Friend of Hirst in America and of Gammeltoft. A good administrator and operator. I did not see much of his investigative work, but teaching of Obstetrics seemed very well done.

John Olof OLOW

Born 1883. Professor in 1923 (Upsala). Olow speaks German and English. Has one of the older buildings in the University hospital - not particularly active in research work, but intelligent and well informed. 100 beds - 53 for Obstetrics.

Ophthalmology

Fritz Gustaf ASK

Born 1876. Professor in 1928 (Lund). His long period as dozent without assistance for investigative work, together with the fact that the Ophthalmological section of the hospital at Lund is in the oldest of the buildings (60 beds) diminishes the significance of his work on the side of medical research. He has not, as far as I could see, any special interests which he is pursuing on the research side.

Johann Wilhelm NORDENSON

Born 1883. Professor in 1927 (Upsala). An exceptionally sensible and broad-minded individual who would be useful as an adviser on general conditions in Sweden. Well informed upon medical education and public health both in Sweden and out of it. Has independent income

Ophthalmology (cont'd)

J.W. Nordenson (ct'd)

which enables him to travel and keep in touch with many individuals. Is the successor of Gullstrand. Has clear and sound ideas upon the importance of investigative work as applied to clinical ophthalmology. Speaks excellent English, German and French.

Pediatrics

Göran af KLERCKER

Born 1871. Professor in 1916 (Lund). Has an excellent hospital, is said to be extremely well read and possessing very good judgement of men. Does not speak English; excellent German. Interested in Biochemistry.

Anders Ivar
THORLING

Born 1878. Professor in 1923 (Upsala). No surgery or orthopedics. Takes premature deliveries and weaklings directly from the Obstetrical Department. 60 beds, 1500 new Out-Patient Department cases a year. Not much investigative work. Malnutrition cases are very rare. Speaks English and German.

Isak JUNDELL

Born 1867. Professor in 1914 (Stockholm). Interested in rickets, scarlet fever and, more especially of late, psychiatry as applied to children. Speaks English, French and German. 85 bed-hospital "Allm.Barnhuset" of which he is chief. Good judgement and well informed. Not actively at work in research at present.

Hygiene and Public Health

Johann Axel HOJER

Born 1890. Dozent in 1924 (Lund). Pupil of Petersson in Stockholm. Especially interested in goiter. His studies in Sweden in this connection do not seem to implicate iodine deficiency. Speaks English and German.

Germund WIRGIN

Born 1866. Professor in 1914 (Upsala). One of the two professors of Hygiene in Sweden, since there is only a Dozent in this subject at the University of Lund. My impression would be that he is more interested in Hygiene, as the term is understood generally, than in Bacteriology or Serology. Laboratory not large, nor are facilities for work in Hygiene considerable. W. speaks English and German and some French. He is certainly the best adviser on teaching of Hygiene in Sweden.

Hygiene & Public Health (cont'd)

Alfred PETERSSON

Born 1867. Professor in 1919 (Stockholm). Almost exclusively interested in Bacteriology and Serology. Very poorly informed on the subject of what in most countries is considered Hygiene and Public Health. He is teacher of C..A. Kling who is very highly regarded in Sweden. Retiring in 1932. Not much investigative work being produced at present. Speaks German.

Orthopedics

Patrik HAGLUND

Born 1870. Professor in 1913 (Stockholm). Very little research work going on. Interesting hospital in that it is really a combination of hospital and trade-school and "factory" providing employment to a large number of cripples under observation and treatment. Inadequate facilities for advanced students. Speaks English and German.

RADIOLOGY

Hugo Fredrik
LAURELL

Born 1884. Title of Laborator (Associate Professor) Upsala, in 1927. Does not speak English; good German. Excellent X-ray department. Original and stimulating person. Has a first assistant and one amanuens. About 30,000 plates a year. L. very highly thought of in Sweden.

Gösta FORSELL

Born 1876. Professor in 1916 (Stockholm). Excellent English, German and probably French. Exceptionally able and well informed. The most authoritative figure in Swedish medicine. Director of the Radiumhemmet and of the Roentgenological Institute of the Serafimer-lazarett. Member of the Medicinalstyrelsen.

Ear, Nose and Throat

Gunnar HOLMGREN

Born 1875. Professor in 1912 (Stockholm). New and remarkably well organized clinic at Sabbatsberg Hosp. 50,000 visits a year in the OPD. Apparently great ability as an organizer and administrator, but very eager also to have younger men doing good investigative work. I had the impression that he would provide more facilities than direction or fragestellung. Speaks English and German.

Psychiatry

Per Henrik Nils
SJOBRING

Born in 1879. Dozent in 1920. Is Chief of Service at the Upsala Asylum. Interested especially in abnormal psychology. The importance attached to Psychiatry as a subject does not appear to be very great in Sweden, and it may be due to this fact that Sjobring gives the impression of being somewhat in eclipse. He has a 1200 bed-hospital. Told me that he had to pack the instruction in Psychiatry into 17 lectures over a two month period. With large administrative responsibilities there is not a very great investigative activity in this department.

SUPPORT AND EQUIPMENT OF RESEARCH

As in many other countries, the regular budget for institutes or clinics for the maintenance of their regular work has failed to keep up with the increased costs of animals, material, etc., so that, from the standpoint of the professors, the State budgets for their work are entirely inadequate. There is unanimous agreement that, if it were not for the Anderssons Fond, they would be unable to do any investigative work, since the budgets would be entirely consumed in light, heating and routine expenses of student instruction.

The THERESE AND JOHANN ANDERSONS MINNE (Foundation) was founded in 1922. Its capital is 5,621,000 Kronen which provide about 250,000 Kronen annually. This money cannot be used for buildings. It is designed for specific research expenses on presentation by the investigator of a plan of his research together with a request for assistance. It is not limited strictly to the medical faculty. It can be used for material or for stipends. There is no limit fixed to the amount allowed for any given undertaking. Allotments are made by a committee of the Karolinska-Institutet in Stockholm - the membership of the committee changing from year to year. There are no permanent officers or trustees. It has proved an extremely useful support to research work and I was struck by the type of comment made throughout Sweden upon its significance, since it was usual to hear some such remark as: "It is not an easy task to select themes or individuals who will contribute greatly to progress in medicine, but the committee of the Anderssons Fond have

been as wise and careful as we could desire, and we could not do better in their place."

Another source of occasional support for research work is the Medical Board of Sweden (Medicinalstyrelsen) which, as in the instance of Professor Gothlin in Upsala, subsidizes investigative work by certain professors on specific problems upon which the Medical Board wishes work done. This ad hoc type of research work is acceptable in many cases since the choice of investigator is largely determined by previous knowledge of his interests and qualifications; the difficulty, of course, is that such support as this is not for an indefinite period nor under elastic and easily adjustable conditions.

H O S P I T A L S

The Swedish hospital organization is predominantly official and governmental, which is shown by the last official computation (1927) to the effect that 46,625 beds belong to official hospital institutions, while private hospitals had an accomodation of only 3,300 beds. Starting in many cases with a few governmental hospitals, the development in Sweden has been first in the multiplication of provincial and later of district hospitals. The provincial hospitals (there are 25 provinces in Sweden) are on the whole the predominating institutions although the six largest towns have numerous hospital accomodations which, in the case of Stockholm and Göteborg, are the most important in the country. In spite of the relatively small importance of the private hospitals, there are three important spheres where private associations have taken upon themselves very important tasks. These are the care of cripples, the treatment of tuberculosis and radio-therapy. In all three of these fields, private agencies have been greatly helped by liberal and highly effective government cooperation in the transport of patients; for example, it is possible for a patient in any part of Sweden to have his railroad fee and even the fee of a friend or attendant paid to Stockholm and return in connection with his visits to the Radiumhemmet. It is noteworthy that the number of hospital beds in Sweden has almost doubled during the past twenty years. The supreme jurisdiction over the official hospitals rests with the State Medical Board. Its approval is necessary for all new buildings or enlargements of buildings. Hospital

superintendents throughout the official institutions are appointed by the government. Assistant medical officials in the hospitals are appointed by the State Medical Board, at the recommendation of the Board of managers of the hospital in question. The nursing personnel is engaged and dismissed by the hospital superintendent, but the State Medical Board maintains inspectors to control the general level of nursing and treatment in the hospitals. Fees in the provincial hospitals are laid down by the provincial legislatures (Landsting), and are therefore not uniform. Only one group of patients, namely venereal patients in the infectious stage, are given, if it is necessary, hospital treatment free of charge. The average fee in 1927 of the provincial hospitals, in the general wards, was 1,75 Kronen per day. The lowest was 1 Krone, and the highest 5 Kronen. In the semi-private wards of 2-4 patients for a room, the charges varied between 5 and 6 Kronen. In the wholly private wards charges were between 7 and 10 Kronen. These charges include all necessary nursing and the patient is not called upon to pay any fee to the medical officer for the treatment received.

The general authority over the medical profession is exercised by the State Medical Board, called the Medicinal-Styrelsen, consisting of the Chairman and five members, four of whom must be physicians and one veterinarian.

NURSES

The general impression received of nursing in Sweden is excellent. The women appeared to have come from very good families. The number of older nurses is somewhat higher, one would suppose, than in America, and the type of work entrusted to the nurses is such as to make their cooperation an important element of medical care.

I visited the Nurses Training School in Lund. The matron was a very superior person, a member of a titled family, Lady Elizabeth Wachtmeister. The course lasts for two years, and the teaching force consists of the Matron, one Sister-Tutor, and three assistant Sister-Tutors. A Lycée preparation is required for entrance, and the candidates must be between 20 and 27 years old. They pay for the two years course. It is usual for them to stay for a third year, during which time they are paid by the hospital. The course begins with a two months practical course in the wards, accompanied by lectures and practical demonstrations. A report is then made upon every student, and those considered unsuitable are eliminated. Then follows a year as probationer. Each ward is under an experienced head nurse.

The nursing home was a beautiful building and contained both a class-room and a room for practical exercises, including cooking and diet preparation. Each bedroom was for two pupil nurses. Lady Wachtmeister has filled the building with beautiful furniture belonging to her own family, and the effect was superior to any nurses' home that I have ever visited.

In Upsala, for a Pediatric ward of 24 patients there was one

head nurse, six nurses in training and one maid. The increasing number of provincial and cottage hospitals creates a satisfactory demand for nurses now being trained. It is perhaps useful to note in this connection that in Lund there is a special institute for the training of masseuses. This institute is apart from the medical faculty or the hospital administration, although it works in excellent cooperation with both the professors and the nursing force of the hospitals. It is entitled the "Sydsvenska Gymnastik Institutet", and is under the combined direction of Major Thulin, Director of Gymnastics in the Swedish Army, and the chief of the Orthopedic Clinic, Dr. Frising, of the University. The girls are received at the age of 18 to 20, and spend two years in theoretical study of Anatomy and Physiology, together with a large amount of physical training and carefully supervised learning of massage, passive exercises, etc. They are admitted together with their teachers on the wards of the hospital, and learn not only how to do massage, but in what types of cases massage or passive exercise is indicated, and exactly what the limitations of this form of treatment are. I have seen nowhere a more intelligent appreciation of the services of physical therapy than is realized at this institute in Lund.

DISTRIBUTION OF DOCTORS

At the end of 1920 there were 1715 practising physicians in Sweden, distributed as follows:

- 24 Departmental Health Officers,
- 336 Provincial Medical Officers (ordinary and special)
- 187 Doctors in Cities, Towns and Urban Districts,
- 84 Tuberculosis Hospital Medical Officers,
- 357 General Hospital Medical Officers,
- 63 Insane Asylum Doctors,
- 39 Prison Doctors,
- 121 Doctors in the Ministry of Communications,
- 122 Professors in the Medical Schools,
- 402 exclusively in private practice.

District Physicians, Hospital Physicians and Medical School Professors must retire at 65. There is at present some over-production of doctors in Sweden, the number of graduates per year being between 110 and 150. The number required to renew the present number of practitioners in Sweden would be more nearly 110. At any rate it is very hard now for young graduates to find places. There is virtually no emigration. Most of the provincial medical officers are in private practice at the same time, receiving from 3-4,000 Kronen from the government and from 10-20,000 Kronen from practice. There is no

marked limitation geographically for the graduates of Upsala, Lund or Stockholm, although, in general, the Northern part of Sweden is supplied from Stockholm and more particularly Upsala, whereas the Southern provinces are supplied by men largely from Lund and in part from Stockholm.

RECOMMENDATIONS

I should recommend that :

1) The present policy of foreign fellowships in medicine, for young Swedish doctors of medicine, be continued and that this program be explicitly stated to the authorities of the two faculties and the Karolinska Institute.

2) That contact be maintained in the future so that possible research needs of Professor Forsell's Radiumhermet and of the pre-clinical branches in Stockholm and Upsala may be thoroughly familiar to the officers of the Medical Sciences. It is at present impossible to advocate definite action in any of these fields since much depends upon the action of the Rigsdag in February - March 1930.

3) It seems reasonable to observe that medical education in Sweden is well-balanced, advanced in its orientation and effective both in its influence upon the practice of medicine and the side of research.

Alau Hegg.